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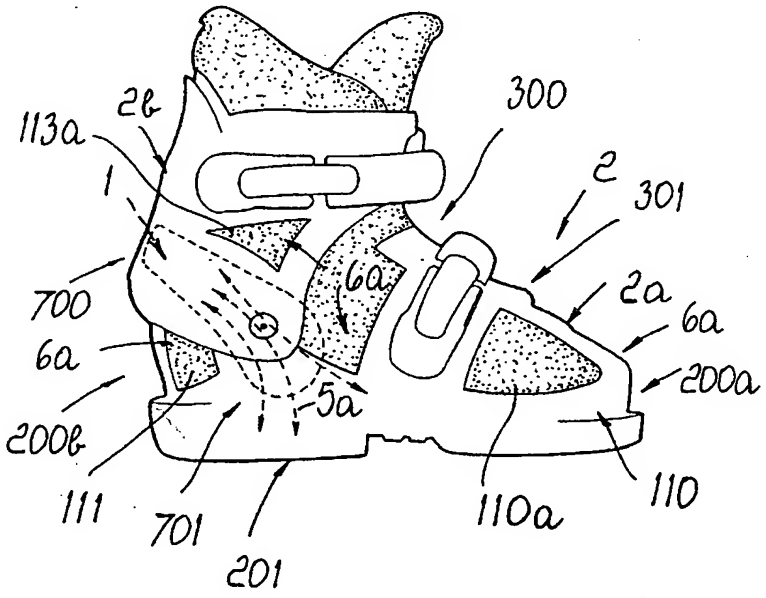
(54) Title: A SPORTS SHOE



(57) Abstract: A sports shoe (2) for practicing a gliding sport, comprising a force transmission structure (300) for consolidating the forces transmitted between a gliding device, associated to said sports shoe, and a foot and a lower portion of the user's leg accomodated in said shoe. The force transmission structure comprises force conveying means (301) for concentrating the forces, which are transmitted between said gliding device and the foot and the lower portion of the user's leg, in a predefined stress region (1) extending approximately from the rear region (700) of the lower portion of the user's leg to the anklebone region (701).

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A SPORTS SHOE

Technical Field

The present invention relates to an improved sports shoe for practicing a gliding sport, such as skiing, skating, snowboarding and the like.

More particularly, the present invention relates to a sports shoe, which provides an optimal management of the forces transmitted between the leg of the user and a gliding device (such as a ski, a skate or the like) associated to the sports shoe, so as to ensure more comfort, improved performances and more safety during the sports activity.

Background Art

A sports shoe of the known type comprises a rigid shell member, which is connected at the bottom to a sole and which is pivotally mounted to a substantially rigid cuff. Typically, the shell and the cuff are designed, so as to surround respectively the foot and the lower portion of the user's leg (i.e. approximately the tibial and calf regions). The assembly comprising the sole, the shell and the cuff constitutes, in practice, a force transmission structure, which allows consolidating the forces that are transmitted between the foot/lower portion of the user's leg and the gliding device.

It is known that, in order to achieve a satisfactory level of force transmission and, therefore, guarantee a good manoeuvrability of the gliding device itself, known sports shoes use force transmission structures that are provided with a high intrinsic rigidity. This is generally obtained by adopting relatively thick shell and cuff members or additional reinforcing elements that are coupled to the cuff or the shell members.

Examples of known sports shoes provided with a high level of rigidity are disclosed in FR-A-2119653, FR-A-2653310 and EP-A-645101.

FR-A-2119653 discloses a ski boot provided with shell and a cuff that are joined in a single element, which is composed of mutually associated portions made of different materials. The main drawback of such a ski boot

is its considerable overall weight, due to the fact that multiple layers of rigid materials are used in the force transmission structure of the ski boot.

FR-A-2653310 discloses a sports shoe which is provided with reinforcing means for improving the rigidity of the force transmission structure of the sports shoe. A pair of rigid U-shaped brackets is used for providing rigidity to the cuff of the sports shoe. This solution entails a relatively cumbersome and heavy force transmission structure, which suffers also evident drawbacks from the aestethic point of view.

EP-A-645101 discloses a sports shoe, which is provided with a force transmission structure comprising a plurality of support elements, which are associated to the shell and the cuff. Although this solution achieves the objects for which it was conceived, it entails some drawbacks, which basically consist of the fact that the force transmission structure remains considerably heavy and cumbersome, since the transmission of forces between the foot and the lower portion of the user's leg and the gliding device still occurs along a relevant plurality of directrixes and, therefore, it is substantially distributed on the cuff and the shell of the sports shoe, from the mechanical point of view.

Thus, it clearly appears that known sports shoes use force transmission structures that are somehow uncomfortable, being provided with relatively thick and heavy members. The use of a cumbersome force transmission structure entails also a substantial decrease in manageability during carrying, considerable difficulties in introducing the foot into the sports shoe and walking before and after the sports activity.

Moreover, the use of relatively thick shell and cuff members, particularly in combination with additional support elements, often implies an increase of the manufacturing costs of the sports shoe.

Disclosure of the Invention

Therefore, the aim of the present invention is to provide a sports shoe, which is capable of making the sports activity more comfortable for the user

and providing, at the same time, a good manoeuvrability of a gliding device, associated to the sports shoe.

Within the above aim, an object of the present invention is to provide a sports shoe, which uses a force transmission structure that is relatively light and low-weight and is provided with a high level of rigidity, at the same time.

A further object of the present invention is to provide a sports shoe, which is structurally simple and can be produced with relatively low manufacturing costs.

This aim and these and other objects wich will become better apparent hereinafter are achieved by a sports shoe for practicing a gliding sport, which comprises a force transmission structure for consolidating the forces transmitted between a gliding device, associated to the sports shoe, and the foot and the lower portion of the user's leg accomodated in the sports shoe, the force transmission structure comprising:

- a relatively rigid sole adapted to be interfaced with the gliding device;
- a relatively rigid shell associated to the sole of the sports shoe and extending beyond it for surrounding, at least partially, the user's foot;
- a cuff associated to the shell and extending beyond it for surrounding, at least partially, the lower portion of the user's leg, characterised in that the force transmission structure comprises force conveying means for concentrating the forces, transmitted between the gliding device and the foot and the lower portion of the user's leg, in a predefined stress region, which extends approximately from the rear region of the lower portion of the leg to the anklebone region.

Brief description of the drawings

Further characteristics and advantages of the sports shoe according to the present invention will become better apparent from the detailed description of some particular embodiments thereof, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a side perspective view of the sports shoe, according to the present invention in a first embodiment;

Figure 2 is a partially sectioned top view of the sports shoe, according to the present invention in a second embodiment;

Figure 3 is a side perspective view of the sports shoe, according to the present invention in a third embodiment;

Figure 4 is a side perspective view of a detail related to the sports shoe of figure 3.

Ways of carrying out the Invention

The sports shoe according to the present invention will be described hereinafter with particular reference to its use as a ski boot. This is only for sake of simplicity and it does not imply any limitation of the scope of the present invention. In fact, the sports shoe according to the present invention can be advantageously used without distinction in many types of gliding sports, such as skiing, snowboarding, skating and the like.

With reference to the figures, the sports shoe according to the present invention is designated by reference number 2. The sports shoe 2 comprises a force transmission structure 300 for consolidating the forces which are transmitted between a gliding device (not shown), associated to the sports shoe 2, and the lower portion of the leg (i.e. the tibial and calf regions) and the foot of the user accomodated in the sports shoe 2. The force transmission structure 300 comprises a relatively rigid sole 201 (Figures 1 and 3), which is aimed at interfacing the sports shoe 2 with the gliding device. The force transmission structure 300 comprises also a relatively rigid shell 2a, which comprises a toe portion 200a and a heel portion 200b. The shell 2a is associated to the sole 201 and extends beyond it, so as to surround, at least partially, the user's foot. A cuff 2b is also provided. The cuff 2b is advantageously associated to the shell 2a and extends beyond it, so as to surround, at least partially, the leg of the user.

The force transmission structure 300 comprises force conveying means 301 for concentrating the forces (see dotted arrows 5a in Figure 1), transmitted between the gliding device and the foot and the leg of the user, in a predefined stress region 1. The predefined stress region 1 extends approximately from the rear region 700 of the lower portion of the leg to the anklebone region 701.

More particularly, the predefined stress region 1 may extend approximately from the rear region 700 of the lower portion of the leg to the internal and/or external malleoli regions of the user's foot.

The advantages brought about by the force transmission structure 300 are remarkable. Thanks to the use of the force convey means 301, a substantially anisotropic transmission of forces occurs through the sports shoe 2. Lines of force are in practice concentrated on the predefined stress region 1, which works as a force short-circuit path. This fact allows avoiding a distributed transmission of forces 5a through the shell 2a and the cuff 2b. In this manner, the shell 2a and the cuff 2b need to be reinforced only at the predefined stress region 1, in order to ensure a satisfactory level of rigidity of the force transmission structure 300. As a result, the shell 2a and the cuff 2b can be realised so as to be overall thinner and lighter.

According to a preferred embodiment of the present invention, the force conveying means 301 comprise predefined relief regions 6a and/or first support elements 6b and/or second support elements 6c, which can co-operate, so as to obtain the conveyment of the forces 5a on the predefined stress region 1.

With reference to Figures 1 and 2, the predefined relief regions 6a may comprise one or more contoured portions 113a of the cuff 2b and/or the shell 2a, which are made, at least partially, of soft or lightweight materials (see Figures 1 and 2).

It should be noticed that the portions 113a cannot transmit stresses, since they are made of soft materials. Thus, with a suitable design, they actively

contribute to the conveyance of the forces 5a through the predefined stress region 1. Nevertheless, the use of the portions 113a has the remarkable advantage of lowering the overall weight of the force transmission structure 300 and the advantage of being particularly suitable for aestethic design.

Preferably, the predefined relief regions 6a may comprise also one or more contoured openings 110 obtained on the cuff 2b and/or on the shell 2a. Also the openings 110 cannot transmit stresses and contribute to the weight lowering of the force transmission structure 300.

The position of the contoured openings 110 may be selected according to the needs. For example, a first contoured opening 110a and/or a second contoured opening 110b may be obtained respectively on a first and/or a second lateral region of the shell 2a, respectively at the internal and external lateral side of the sports shoe 2. Further, with reference to Figures 2 and 3, the first contoured opening 110a may be delimited by the toe portion 200a, the heel portion 200b, the sole 201 and/or a first lateral edge 500 of the shell 2a, which extends beyond the sole 201. Moreover, the first contoured opening 110a may be delimited also by a frontal portion 118 of the shell 2a, which is aimed at surrounding, at least partially, the metatarsal region of the user's foot. Of course, also the second contoured opening 110b may be designed as the first contoured opening 110a. Thus, it may be delimited by the toe portion 200a, the heel portion 200b, the sole 201 and/or a second lateral edge 501 of the shell 2a (Figure 2) and, additionally, by the front portion 118 of the shell 2a.

The front portion 118 can advantageously support suitable closing means 117 that may comprise one or more locking devices (as illustrated in figure 4) or other different arrangements, such as tension wire mechanisms or lace arrangements or the like. In this manner, the closing means 117 can discharge their closing pressure onto the front portion 118, which may be suitably curved, so as to follow the shape of the user's foot. Preferably, the front portion 118 (see arrow 600 of Figure 3) can be movably connected to

the toe portion 200a. This arrangement is particularly useful for ensuring more comfort to the user during sports activity. Preferably, with reference to Figures 1 e 3, the predefined relief regions 6a comprise also one or more third contoured openings 111 that are provided on the heel portion 200b of the shell 2a and/or one or more fourth contoured openings 112 (figures 1and 3) provided on the cuff 2b. Functionality and the advantages of the third and the fourth contoured openings 111 and 112 are basically similar to those described for the second contoured openings 110.

As mentioned above, the force conveying means 301 comprise also first support elements 6b and second support elements 6c.

The advantage of using the first support elements 6b and/or the second support elements 6c basically consists in that these elements contribute to ensure a preferred path for the stresses transmitted during the sport activity. Further, they have the important function of suitably reinforcing the predefined stress region 1. In this manner, the remaining portions of the shell 2a and the cuff 2b can be realised remarkably thinner and lighter, without reducing the overall rigidity and sturdiness of the force transmission structure 300.

Preferably, the first support elements 6b are associated to the shell 2a and the cuff 2b, so as to surround, at least partially, the rear region 700 of the lower portion of the user's leg and/or cover, at least partially, the anklebone region 701 of the foot. The first support elements 6b can be made of various materials, according to the needs. For example, metal materials and/or plastic materials and/or carbon materials and/or light alloy materials and/or resilient materials can be advantageously used. Moreover, the first support elements 6b can be designed according to various shapes, depending on the needs. According to a preferred embodiment, illustrated in Figure 2, the first support elements 6b comprise a first strip 302a associated to the cuff 2b and the shell 2a. The first strip 302a is substantially half-U-shaped and is rigidly connected to the shell 2a and/or the cuff 2b. A second strip 302b may also be

used, substantially half-U-shaped, which is also rigidly connected to the shell 2a and/or the cuff 2b. Advantageously, the second strip 302b is associated to the first strip 302a, so as to provide a substantially U-shaped support arrangement to surround the rear region 700 of the lower portion of the leg. Alternatively, as illustrated in Figures 3 and 4 a third strip 303, substantially U-shaped, may be used. The connection with the shell 2a and/or the cuff 2b can occur in different manners, according to the needs. For example, a first pair of bores 107 may be provided approximately in the median area of the wings of the strip 303, to permit the passage of a first pair of hinge pins 108. Further, a second pair of bores 115 may be provided near the free ends 105 of the third strip 303, in such a way as to permit the positioning of a second pair of hinge pins 106, for interconnection with the shell 200a. It should be noticed that, in this manner, the third strip 303 is attached in a non pivoting way to the shell 200a, since it presents four points of restraint with the same. This ensures an improved preferential path for stresses transmitted during the sports activity.

With reference to Figure 2, the second support elements 6c comprise preferably one or more reinforcing ribs provided on the shell 2a and/or the cuff 2b. Preferably, these reinforcing ribs are provided on the shell 2a and/or the cuff 2b, so as to surround, at least partially, the rear region 700 of the user' leg and/or cover, at least partially, the anklebone region 701.

According to another preferred embodiment (not illustrated) the shell 2a and/or 2b cuff as well as the predefined relief regions 6a can be covered, at least partially, by one or more layers of soft or lightweight materials (not shown).

As illustrated in Figure 3, the sports shoe 2 can also comprise an inner boot 113, which might be removable or fixed to the sole 201 and/or the shell 2a and/or the cuff 2b. Preferably, the inner boot 113 may comprise one or more waterproof layers. In this manner, the inner boot 113 can be in direct contact with external environmental agents, for example through the

openings 110, 111, 112, which can be particularly useful for this aim. Thus, the inner boot 113 can be visible on the outside of the sport shoe 2 and, therefore, this fact can be used for design purposes. Thereby, a higher flexibility in design is possible and innovative solutions also from the aestethic point of view can be easily realised.

It has been proven in practice that the sports shoe 2, according to the present invention, achieves the intended aim and objects.

In fact, the adoption of force conveying means 301 allows the transmission of forces between the user's leg and foot and the gliding device to occur in a more controlled manner. As a result, structural designing constraints, aimed at ensuring rigidity to the force transmission structure 300 of the sports shoe 2 can be remarkably reduced. Thus, soft and lighter materials can be easily used for the realisation of the sports shoe 2, without compromising its capability of driving the gliding device to which it is associated. All these facts determine more comfort for the user during the sports activity and improve performances in terms of manoeuvrability of the gliding device. Moreover, thanks to the reduction of the mentioned structural constraints, more flexibility in design is achieved and innovative aestethic solutions are possible without reducing the safety and the comfort of the user.

Finally, reduction of weight and simplification of the sports shoe structure allows achieving manufacturing costs that are remarkably lower with respect of the known sports shoes.

The disclosures in Italian Patent Application No. TV2001A000053 from which this application claims priority are incorporated herein by reference.

CLAIMS

1. A sports shoe for practicing a gliding sport, comprising a force transmission structure for consolidating the forces transmitted between a gliding device, associated to said sports shoe, and a foot and a lower portion of the user's leg accomodated in said shoe, said force transmission structure comprising:

- a relatively rigid sole adapted to be interfaced with said gliding device;
- a relatively rigid shell associated to said sole and extending beyond said sole for surrounding, at least partially, the user's foot;
- a cuff associated to said shell and extending beyond said shell for surrounding, at least partially, the lower portion of the user's leg;

characterised in that said force transmission structure comprises force conveying means for concentrating the forces, which are transmitted between said gliding device and the foot and the lower portion of the user's leg, in a predefined stress region, said predefined stress region extending from the rear region of the lower portion of the leg to the anklebone region of the user.

2. The sports shoe, according to claim 1, characterised in that said predefined stress region extends from the rear region of the lower portion of the user's leg to the internal and/or external malleoli region of the user's foot.

3. The sports shoe, according to one or more of preceding claims, characterised in that said force conveying means comprise one or more predefined relief regions and/or one or more first support elements and/or one or more second support elements.

4. The sports shoe, according to claim 3, characterised in that said predefined relief regions co-operate with said first support elements and/or said second support elements, so as to convey in said predefined stress region the forces, which are transmitted between said gliding device and the foot and the lower portion of the user's leg.

5. The sports shoe, according to one or more of claims 3 and 4, characterised in that said predefined relief regions comprise one or more contoured portions provided on said cuff and/or said shell, said contoured portions being made, at least partially, of soft or lightweight materials.

6. The sports shoe, according to one or more of claims 3 to 5, characterised in that said predefined relief regions comprise one or more contoured openings provided on said cuff and/or said shell.

7. The sports shoe, according to claim 6, characterised in that said contoured openings comprise at least:

- a first contoured opening, which is provided on a first lateral region of said shell; and/or

- a second contoured opening, which is provided on a second lateral region of said shell.

8. The sports shoe, according to claim 7, characterised in that said first contoured opening is delimited by a toe portion and a heel portion of said shell, said sole and/or a first lateral edge of said shell, said first lateral edge extending beyond said sole, at a first lateral side of said sport shoe.

9. The sports shoe, according to claim 8, characterised in that said first contoured opening is delimited by a front portion of said shell, said front portion surrounding, at least partially, the metatarsal region of the user's foot and being movably connected to the toe portion of said shell.

10. The sports shoe, according to one or more of claims 7 to 9, characterised in that said second contoured opening is delimited by said toe portion, said heel portion, said sole and/or a second lateral edge of said shell, said second lateral edge extending beyond said sole, at a second lateral side of said sport shoe.

11. The sports shoe, according to one or more of claims 7 and 10, characterised in that said second contoured opening is delimited by said front portion of said shell.

12. The sports shoe, according to one or more of the preceding claims,

characterised in that said predefined relief regions comprise:
one or more third contoured openings, said third contoured openings being provided on the heel portion of said shell; and/or
one or more fourth contoured openings, said fourth contoured openings being provided on the said cuff.

13. The sports shoe, according to one or more of preceding claims, characterised in that said first support elements are associated to said shell and said cuff, so as to surround, at least partially, the rear region of the lower potion of the user's leg and/or cover, at least partially, the anklebone region.

14. The sports shoe, according to one or more of preceding claims, characterised in that said first support elements are made, at least partially, of metal materials and/or plastic materials and/or carbon materials and/or light alloy materials and/or resilient materials.

15. The sports shoe, according to claims 13 and 14, characterised in that said first support elements comprise a first strip associated to said cuff and said shell, said first strip being substantially half-U-shaped and being rigidly connected with said shell and/or said cuff.

16. The sports shoe, according to claims 13 to 15, characterised in that said first support elements comprise a second strip associated to said cuff and said shell, said strip being substantially half-U-shaped and being rigidly connected with said shell and/or said cuff, said second strip being associated to said first strip, so as to provide a substantially U-shaped support element to surround the rear portion of the user's leg.

17. The sports shoe, according to one or more of claims 13 and 14 , characterised in that said first support elements comprise a third strip associated to said cuff and said shell, said strip being substantially U-shaped to surround the rear portion of the user's leg and being rigidly connected with said shell and/or said cuff.

18. The sports shoe, according to one or more of preceding claims, characterised in that said second support elements comprise one or more

reinforcing ribs provided on said shell and/or said cuff.

19. The sports shoe, according to claim 18, characterised in that said reinforcing ribs are provided on said shell and/or said cuff, so as to surround, at least partially, the rear region of the user's leg and/or cover, at least partially, the anklebone region.

20. The sports shoe, according to one or more of preceding claims, characterised in that said shell and/or said cuff are covered, at least partially, by at least a layer of soft or lightweight materials.

21. The sports shoe, according to one or more of preceding claims, characterised in that said predefined relief regions are covered, at least partially, by at least a layer of soft or lightweight materials.

22. The sports shoe, according to one or more of preceding claims, characterised in that it comprises a removable inner boot, said inner boot comprising at least a waterproof layer.

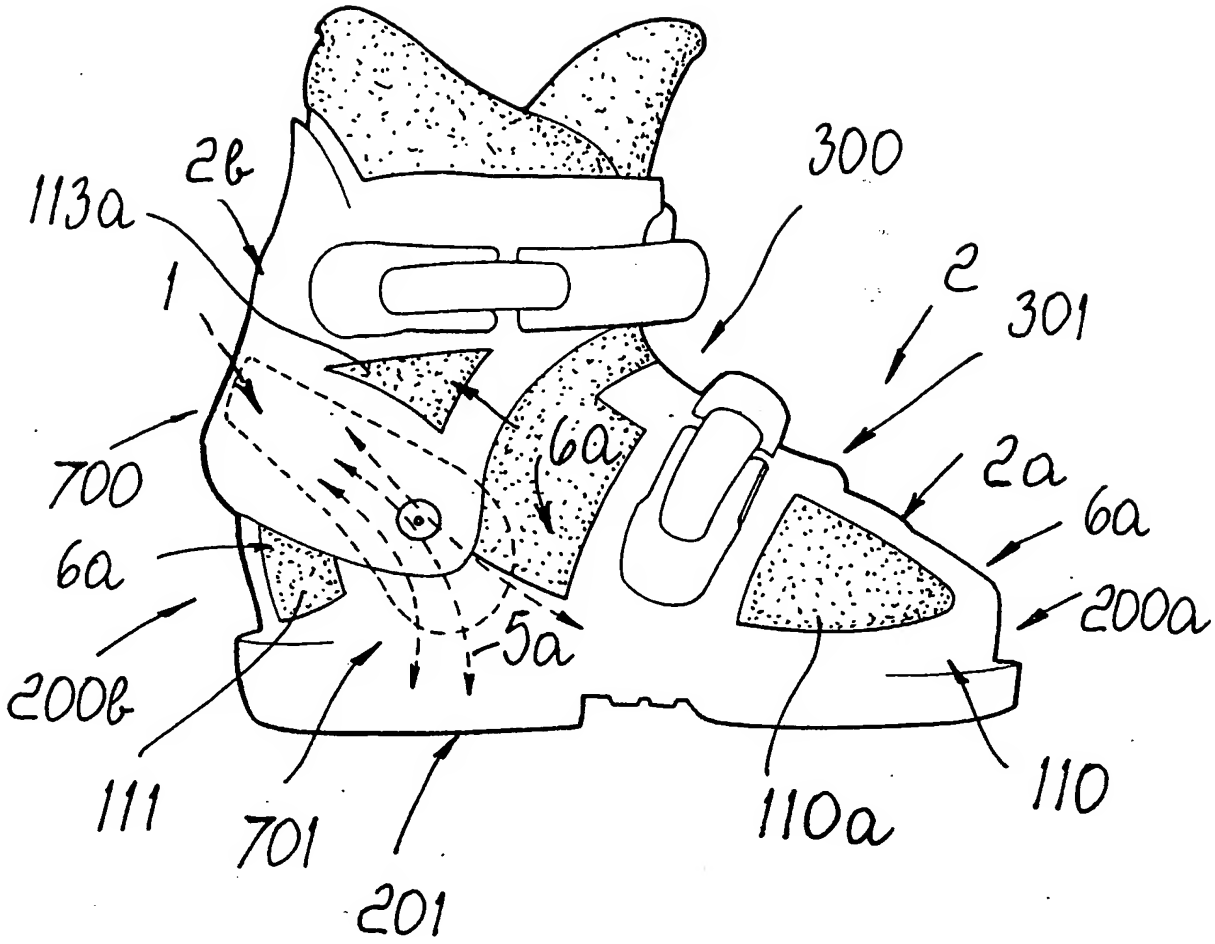

Fig. 1

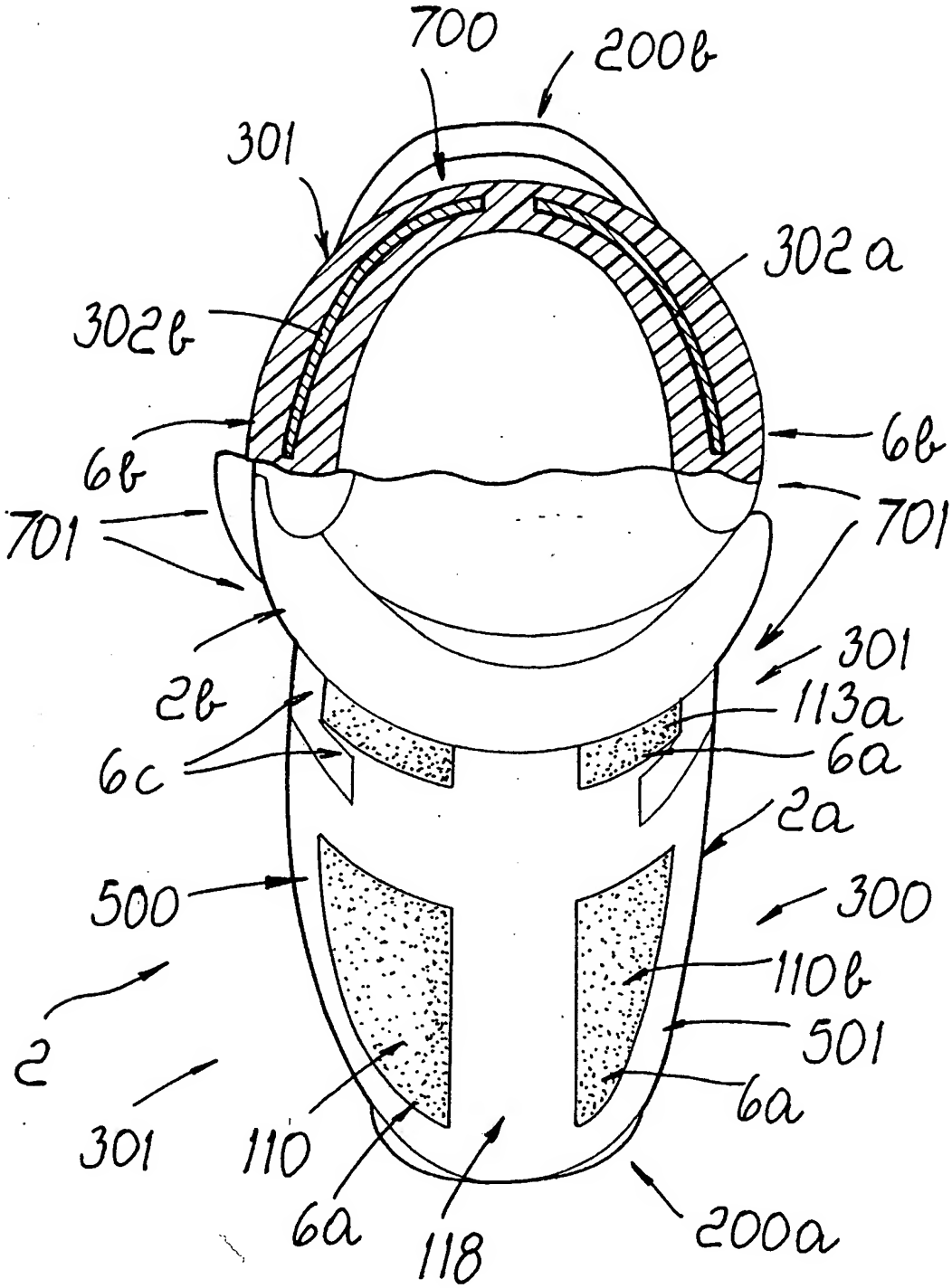

Fig. 2

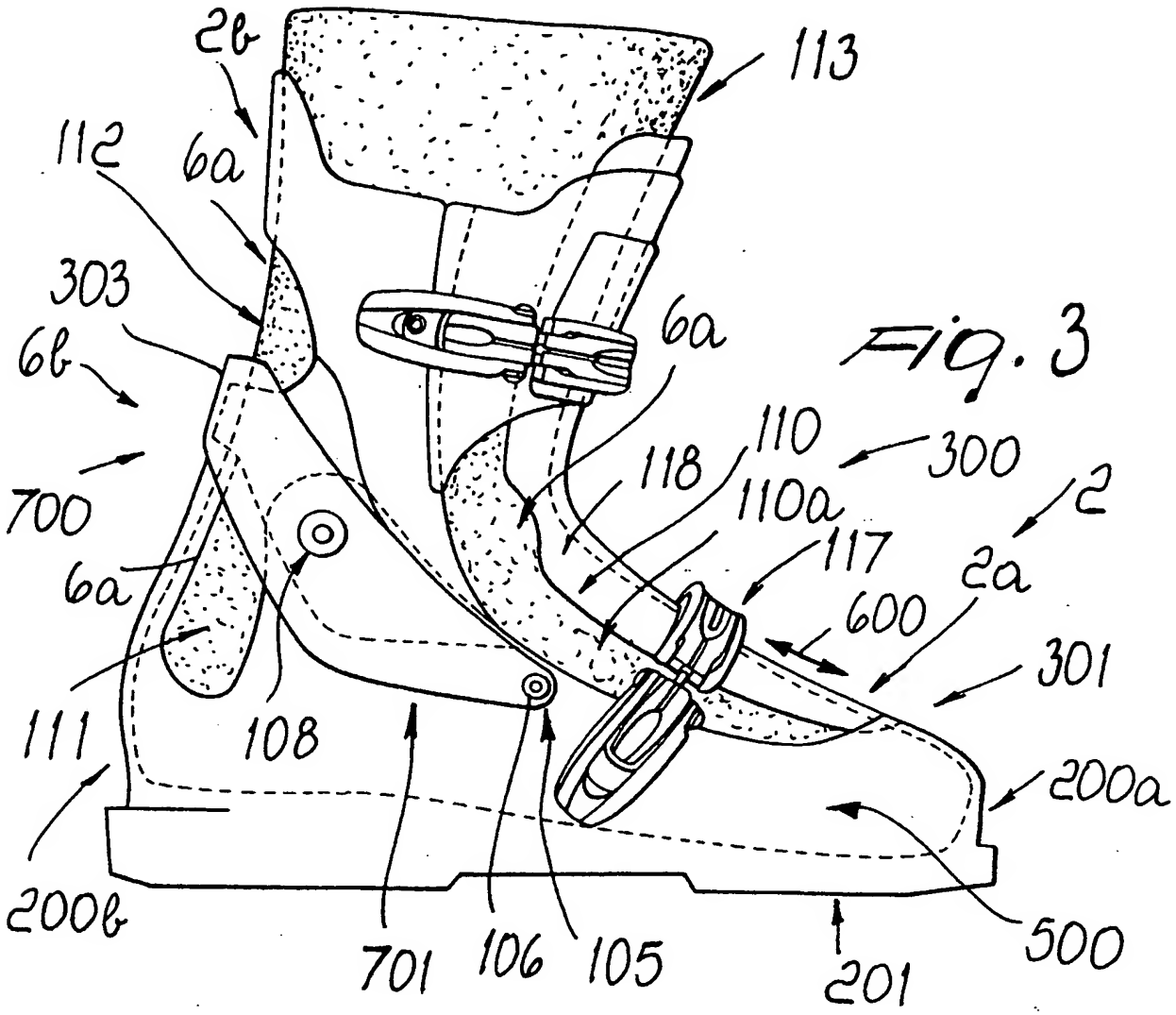

Fig. 3

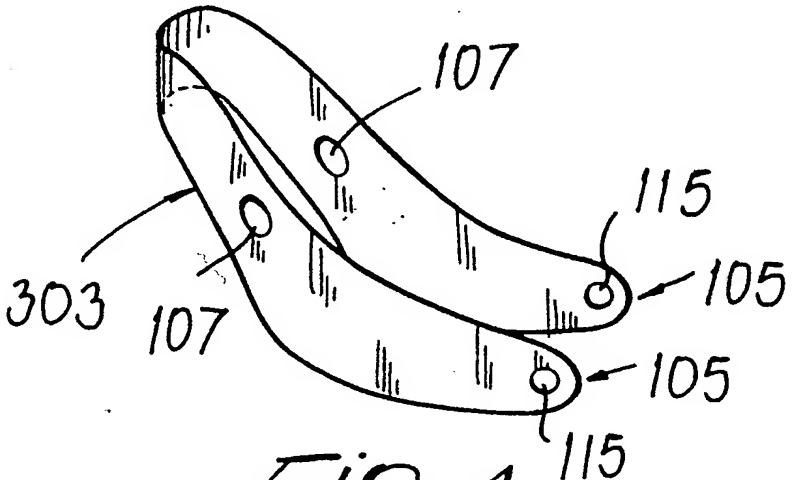

Fig. 4